DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 4c, 22c, 1e, and 35. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 4, 6-8, 10, 11, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (US 6359370) in view of Bullock (US 4140936).

4. With respect to claim 1, Chang discloses a piezo-electric actuator (Fig 1) comprising: a piezo-electric element (item 106) having a piezo-electric body which is provided with at least two opposing surfaces (Fig 1), wherein the surfaces perform an expanding and contracting motion in accordance with a state of an electric field (column 3, lines 30-51); a constraint member (center of cruciform base 104) for constraining the piezo-electric element on at least one of the two sides, a supporting member (item 102) disposed around the constraint member, and a plurality of beam members (item 104) each having both ends that are fixed to the constraint member and the supporting member, respectively (Fig 1), wherein each beam member has a neutral axis for bending in a direction substantially parallel with the constrained surface (Fig 12 and column 6, lines 4-26), wherein the constraint member vibrates by vibration which is generated by constraining effect between the constraint member and the piezo-electric element, and is amplified by the beam members (inherent to the structure), wherein said beam members are straight beams (Figures 1 and 2).

Chang does not disclose expressly that the supporting member does not extend below the constraint member.

Bullock teaches a piezoelectric actuator (Fig 1), in which the supporting member (item 4) does not extend below the constraint member (item 3).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the supporting member arrangement with the piezoelectric actuator of Chang for the benefit of reducing the amount of material required by eliminating the bottom portion of the supporting member.

5. With respect to claim 3, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Chang discloses that said constraint member has a base (center of cruciform base 104) for constraining said piezo-electric element, and a plurality of arms (item 104) that extend from said base to constitute said beam members (Fig 1).

6. With respect to claim 4, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Bullock discloses that said constraint member is a second piezoelectric element which differs in vibration direction from a first piezoelectric body (Fig 1).

7. With respect to claim 6, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Chang discloses that said piezoelectric element is provided with an insulating layer (item 104) on at least one of said two surfaces.

8. With respect to claim 7, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Chang discloses that said piezo-electric element has a rectangular parallelepiped shape (Fig 1).

9. With respect to claim 8, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Chang discloses a vibrating film (item 104) coupled to said piezo-electric actuator (Fig 1) for radiating sound through vibration that is transmitted from said piezo-electric actuator. The movement of the piezo-electric element would generate “sound” in that it would generate pressure waves in the air surrounding it.

10. With respect to claims 10 and 11, the combination of Chang and Bullock discloses the piezo-electric actuator according to claims 1 and 8 respectively; therefore, Chang as modified by Bullock discloses an electronic device comprising these actuators, as piezo-electric actuators are electronic devices.

11. With respect to claim 14, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Bullock discloses that the constraint member (item 3) and the plurality of beam members (item 7 and 8) are made of metal or resin (column 2, lines 33-36).

12. With respect to claim 15, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Both Chang et al. and Bullock disclose that the constraint member and the plurality of beam members are integrated (Fig 1 of Chang and Fig 1 of Bullock).

13. With respect to claim 16, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1. Chang discloses that at least two beam members extend radially from the center of the constraint member (Fig 1).

14. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang in view of Bullock and Sasaki et al. (US 7067965).

15. With respect to claim 5, the combination of Chang and Bullock discloses the piezoelectric actuator according to claim 1.

Neither Chang nor Bullock discloses expressly that said piezo-electric element comprises a plurality of said piezo-electric bodies and a plurality of electrode layers for

applying an electric field to said piezo-electric bodies, wherein each piezo-electric body and each electrode layer is alternately laminated.

Sasaki et al. teaches a piezo-electric actuator in which the piezo-electric element comprises a plurality of said piezo-electric bodies and a plurality of electrode layers for applying an electric field to said piezo-electric bodies, wherein each piezo-electric body and each electrode layer is alternately laminated (Fig 3).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the stacked piezo-electric element of Sasaki et al. with the piezo-electric actuators of Chang as modified by Bullock for the benefit of allowing for larger displacements (column 1, lines 37-42).

16. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang in view of Bullock and Toki (US 5856956).

Neither Chang nor Bullock discloses expressly a vibration transmitting member sandwiched between said piezo-electric actuator and said vibrating film.

Toki teaches a piezo-electric speaker device that includes a vibration transmitting member (item 46) sandwiched between a piezo-electric actuator (item 47) and a vibrating film (item 42).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the vibration transmitting member of Toki with the piezo-electric actuators of Chang as modified by Bullock for the benefit of crating a device in which the diaphragm itself need not be distorted (column 5, lines 53-58 of Toki).

17. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang in view of Bullock and Ogura et al. (US 6453050).

18. With respect to claim 12, the combination of Chang and Bullock discloses the acoustic element according to claim 8.

Neither Chang nor Bullock discloses expressly a plurality of acoustic resonators which have resonance frequencies different from each other for smoothing frequency response of sound pressure.

Ogura et al. discloses an acoustic apparatus comprising a plurality of acoustic elements (figures 4 and 5) which have resonance frequencies different from each other for smoothing frequency response of sound pressure (column 11, lines 62-64).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the plurality of acoustic elements of Ogura et al. with the acoustic element of Chang as modified by Bullock for the benefit of providing additional output sources and reducing the peak dip of the output (column 11, lines 62-64 of Ogura et al.).

19. With respect to claim 13, the combination of Chang, Bullock, and Ogura et al. discloses the acoustic apparatus accord to claim 12. As the acoustic apparatus is itself an electronic device, the combination of Chang, Bullock, and Ogura et al. disclose an electronic device including the acoustic apparatus according to claim 8.

Response to Arguments

20. Applicant's arguments filed 9 May 2008 have been fully considered but they are not persuasive. Applicant argues that it would not be obvious to combine Chang and Bullock as the device of Change states that it is support laterally and along its underside. However, Bullock does disclose that its beam members (items 7 and 8) are supported along their undersides by the support member (items 4 and 6), and the support member does not extend under the constraint member (item 3). Applicant argues the differences between the functionalities of Chang and of the claimed invention. However, these functions are not currently claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is (571) 272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leung Quyen can be reached on (571) 272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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